

Biomass District Heating

A Case study from a College Campus

Massachusetts Smart Growth - Smart Energy Conference
Boston Convention Center
December 12, 2008



Mount Wachusett
Community College

444 Green Street, Gardner, MA 01440-1000

Think Green: Educate and Engage

Critical Issues

- ▶ Source
- ▶ Price
- ▶ Environmental
- ▶ Feasibility
- ▶ Financing
- ▶ Construction
- ▶ Maintenance
- ▶ A Case Study



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**Department of Energy Resources
Department of Conservation and Recreation**

Western MA (5 Counties) – Resource Assessment

Regional Resource Assessment – Worcester

Regional Resource Assessment – Springfield

Regional Resource Assessment – Pittsfield

Economic Impact of Biomass Energy in Massachusetts

Forest Biomass Harvesting – Silviculture and Ecological Considerations

Advanced Biopower – Technology Assessment

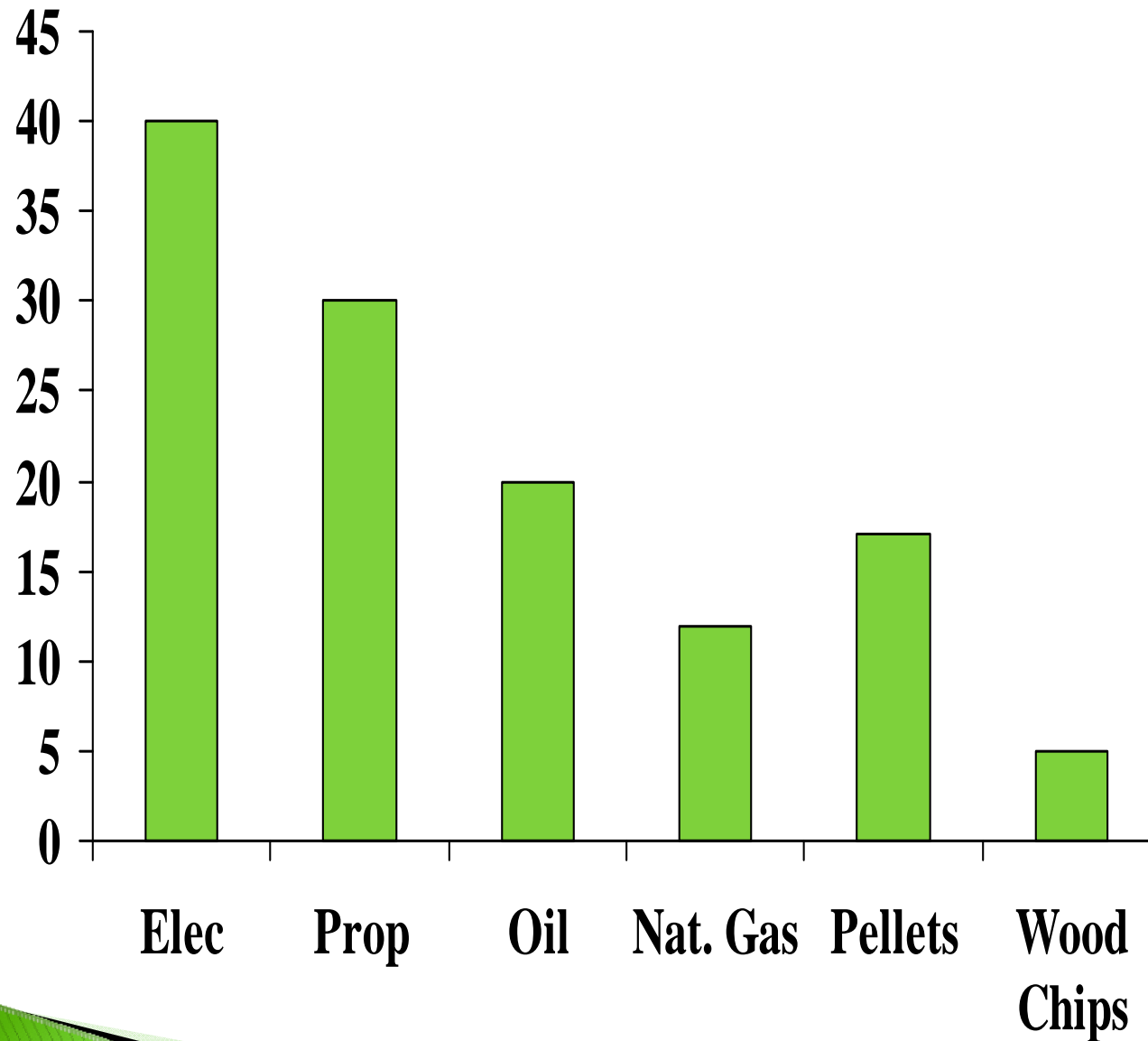


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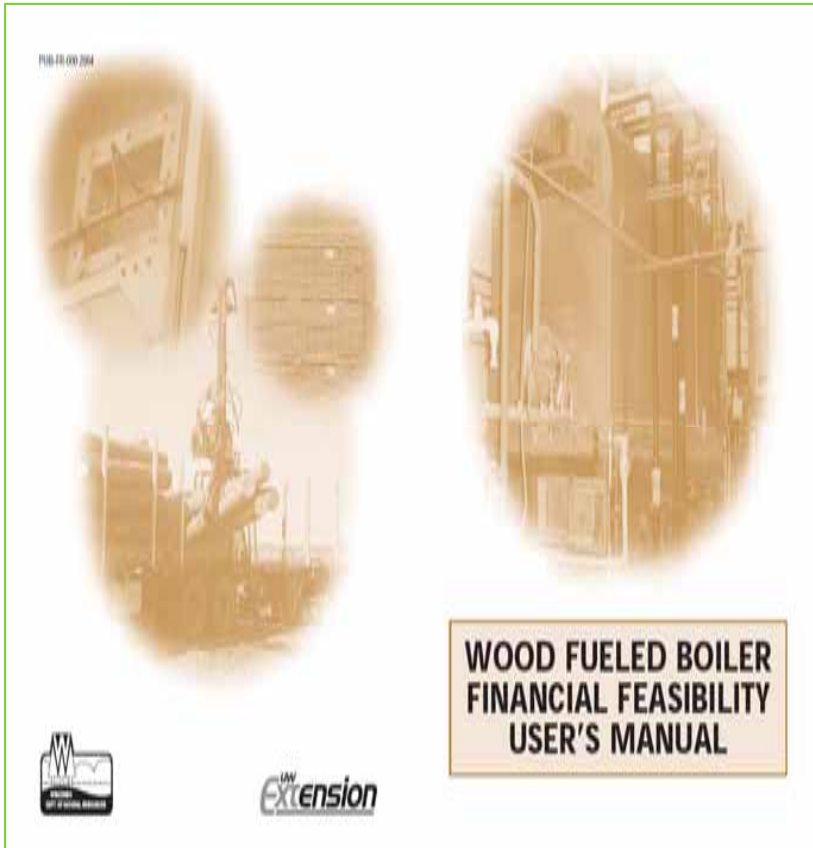
Fuel Cost Comparisons



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Sources of Information



Wood Fuel Financial Feasibility Spreadsheets and manual developed by Bob Govett, University of Wisconsin-Stevens Point

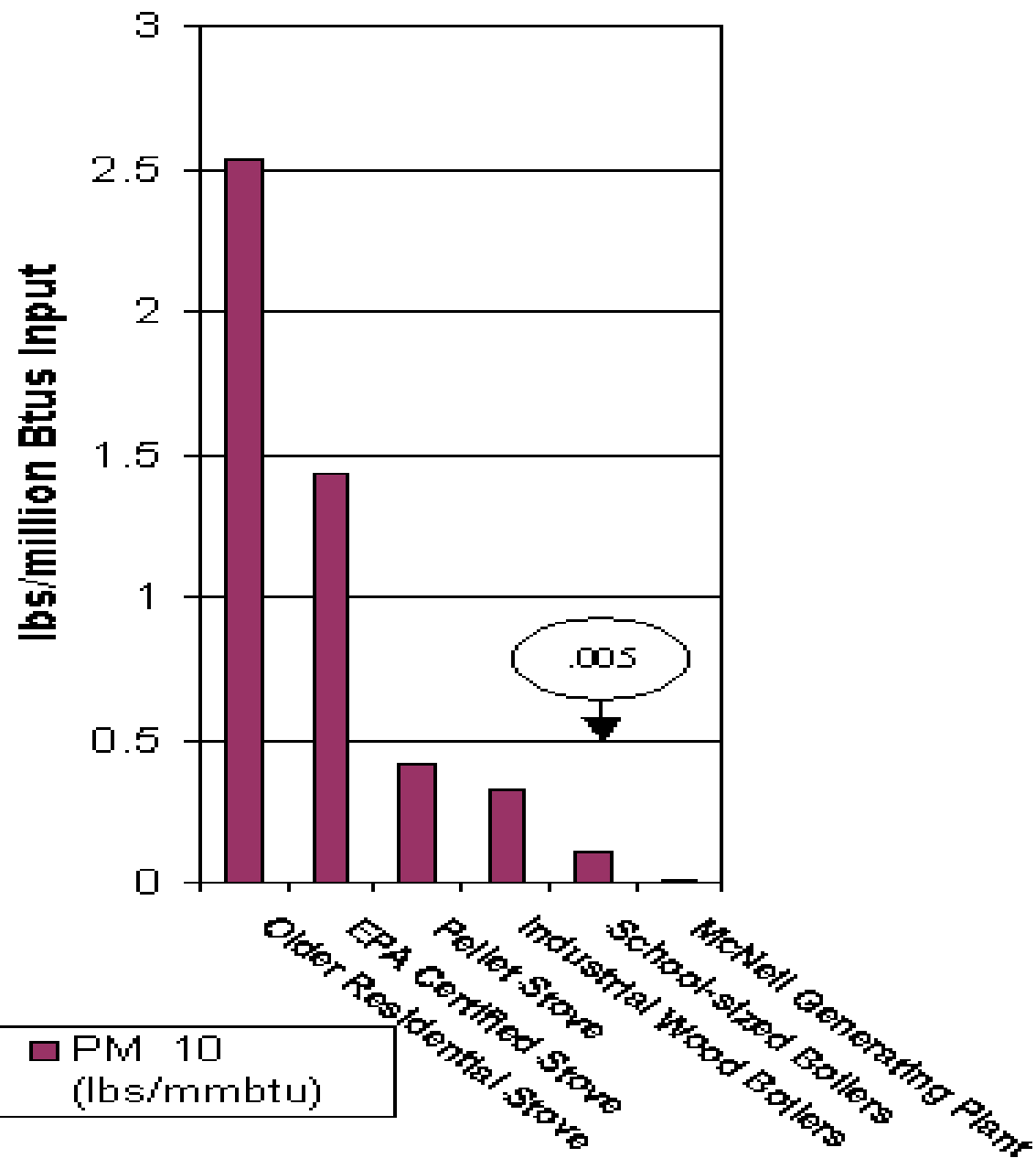
- ▶ US Forest Service; Forest Products Laboratory
- ▶ <http://www.fpl.fs.fed.us/index.html>
- ▶ The **Technology Marketing Unit** provides technical assistance for improving utilization and marketing of forest products.
- ▶ Wood for Energy
- ▶ [Wood Chips to Electricity Video](#) (1:54 minute)
- ▶ [Basic Wood Energy Information](#)
- ▶ [Wood Burning Equipment](#)
- ▶ [Wood Gasification Equipment](#)
- ▶ [Partial List of Biomass System Manufacturers](#)
- ▶ [Partial List of Multi-Fuel Biomass System Manufacturers](#)
- ▶ [Cost Analysis for Small-Scale Wood Combustion System](#)
- ▶ [Wood-Fired Boiler Sizes and Costs](#)
- ▶ [Wood Biomass for Energy](#)
- ▶ [Biomass for Small-Scale Heat and Power](#)
- ▶ [Biomass for Heat and Power](#)
- ▶ [Primer on Wood Biomass for Energy](#)
- ▶ [Report of the Intelligent Consumption Project](#)
- ▶ [Energy from Wood](#)
- ▶ [United States Wood Biomass for Energy and Chemicals: Possible Charges in Supply, End Uses, and Environmental Impacts](#)
- ▶ [Biofuels: Production and Potential](#)
- ▶ [Should Whole-Tree Chips for Fuel Be Dried Before Storage?](#)
- ▶ [Sources and Uses of Wood for Energy](#)
- ▶ [How To Estimate Recoverable Heat Energy in Wood or Bark Fuels](#)
- ▶ [Energy Properties of Wood](#)



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Particulate Matter from Various Wood Combustion Systems

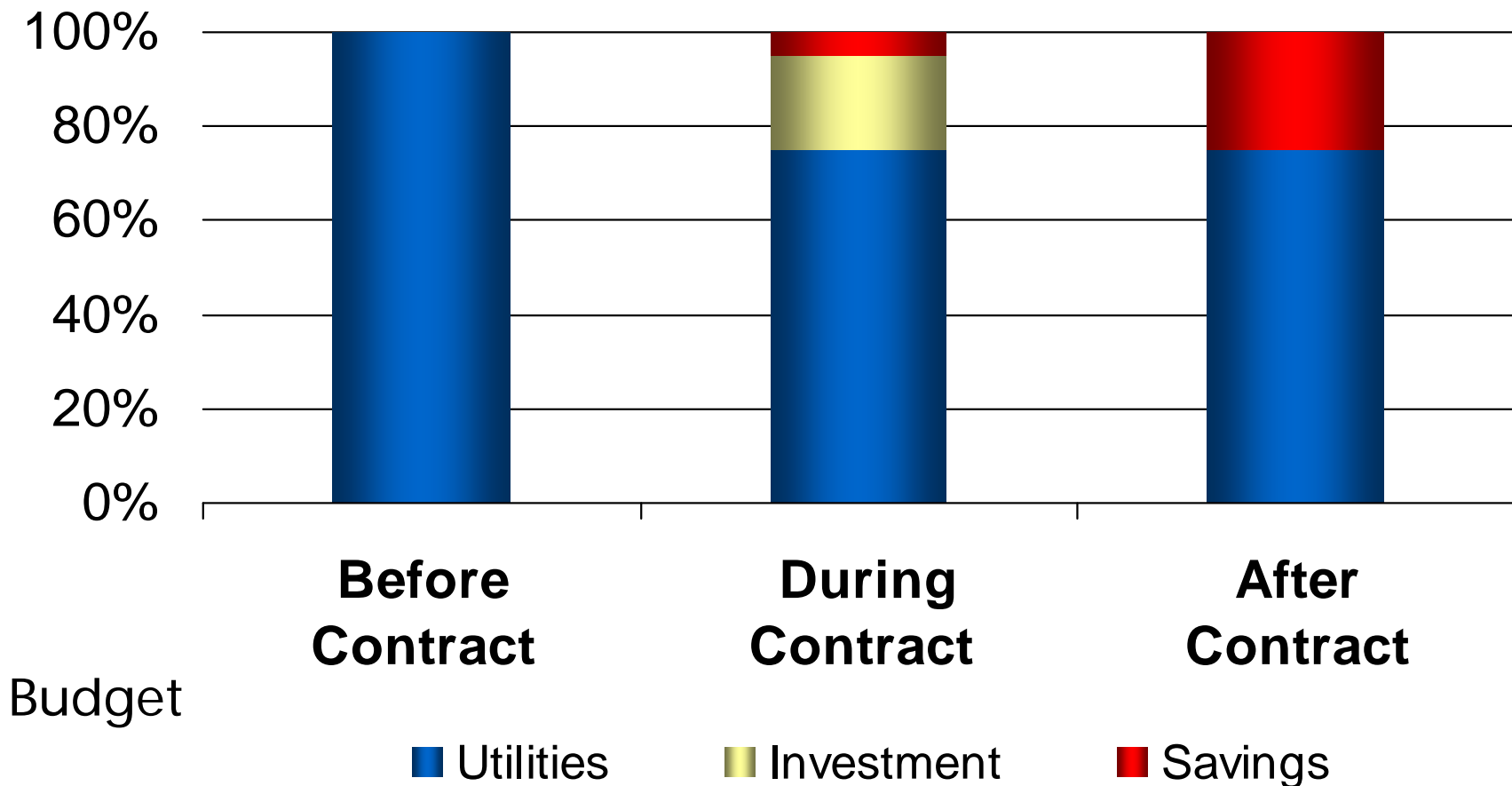


Source:

Biomass Energy Resource Center
Montpelier, VT

Performance Contracting

Project Costs are Paid from Existing Budgets



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BIOMASS POWER PLANT



Biomass District Heating System

- ▶ Retrofit 450,000 sq. ft. with Hydronic system
- ▶ New Power Plant building
- ▶ Biomass Storage, Conveyance, and Combustion System
- ▶ BACT Emission Control
- ▶ 325 bhp Cleaver Brooks #2 Oil Boiler
(shoulder months)
- ▶ Process Controls
- ▶ Digital Energy Management Integration



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Biomass District Heat

The Biomass District Heating System

- Start-up date: December 2002
- Closed loop, two pipe hydronic heating system
- 8Mbtu (million British thermal units)
Messersmith Inc. Combustion unit
- Hurst fire tube boiler (heat exchanger)
- Chip storage: 65-90 tons
- Annual chip consumption: 1500 tons
- Feedstock: green hardwood sawmill residue chips
- Emission controls: baghouse



District heat



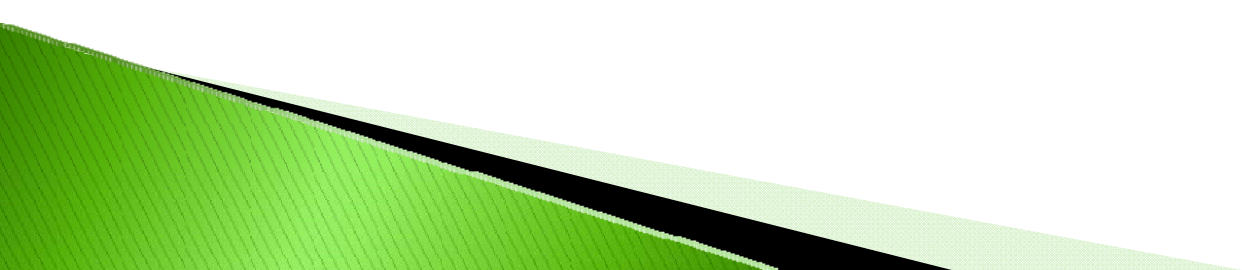
Courtesy of Gordon Boyce





Maintenance

- ▶ Ash Removal
fly ash & bottom ash
- ▶ Boiler Tubes
- ▶ Glycol



COMBINED HEAT & POWER RESEARCH PROJECT

BioMax 50

BIOENERGY POWER SYSTEM



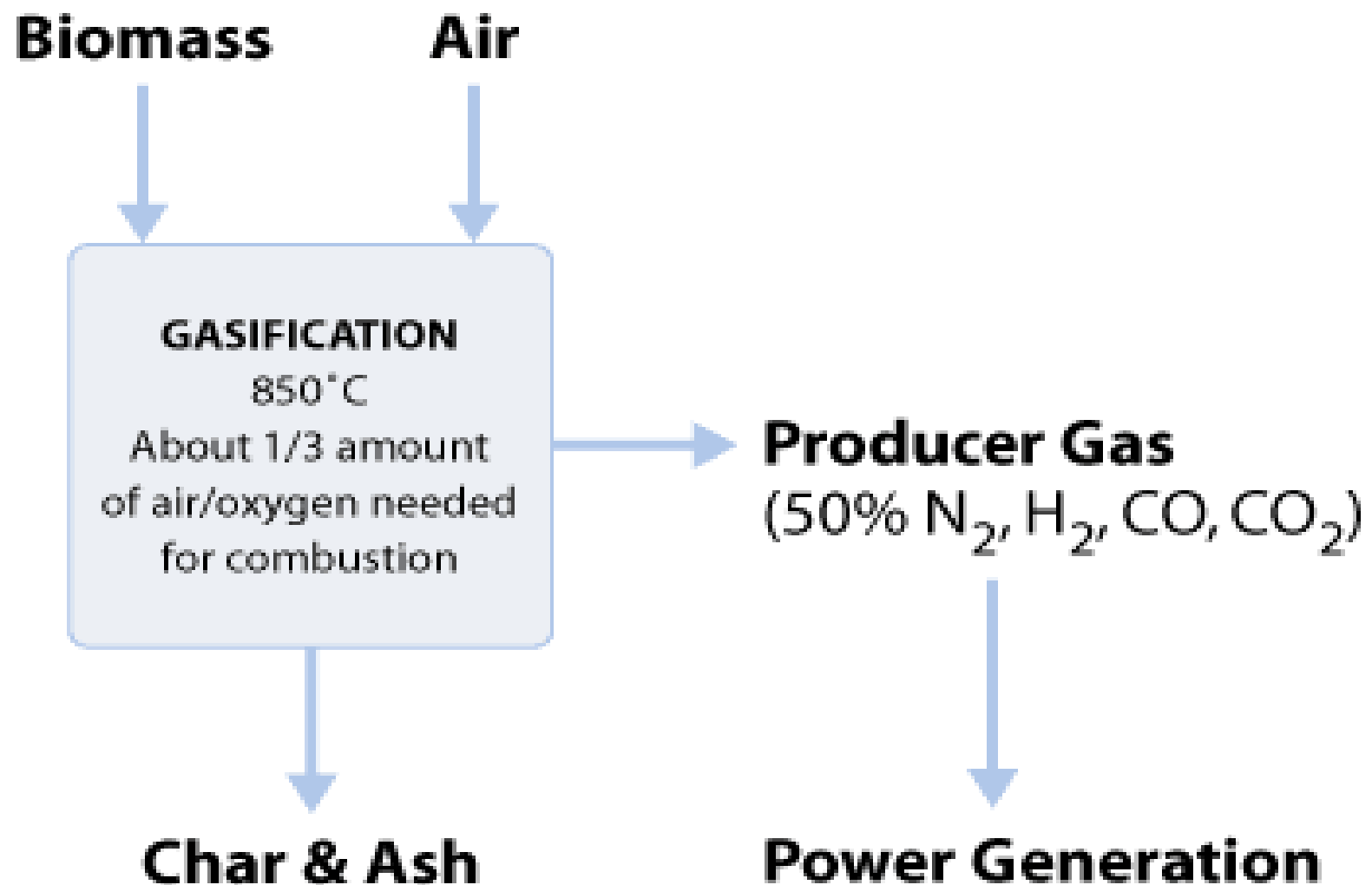
Manufactured By

Community Power Corporation

8110 Shaffer Parkway
Littleton, Colorado, USA 80127
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Small Modular Applications

Biomass Gasification via Partial Oxidation (Auto Thermal)



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